ENGINEERING TOMORROW

Case story | VACON® NXP

VACON® drives propel Northern Leader

J.M. Martinac Shipbuilding in Tacoma, WA, United States, has been building ships since 1924. The company started with fishing vessels, and over the years has built more than 300 vessels of various types. Martinac's latest project, the Northern Leader, is the largest longliner ever built in the US and one of the largest in the world. It is also eco-friendly.

The Northern Leader was launched at high tide on January 26, 2013 and commissioned sea worthy in Seattle's Puget Sound during the spring. The Northern Leader is one of the largest longliners and one of the most eco-friendly commercial fishing vessels ever constructed, with a length of 184 feet (56 m) and a total weight of 1,600 tons.

Owned by Alaskan Leader Fisheries, the Northern Leader will support the longline fisheries of the North Pacific, Bering Sea and Aleutian Islands and will sail out of Kodiak, Alaska.

Diesel-electric propulsion with lower emissions and higher fuel efficiency

Designed by Seattle-based Jensen Maritime, a Crowley company, the vessel uses equipment that causes minimal environmental impact on the ocean's ecosystem, while maintaining the lightest possible operational fossil fuel footprint. Designed to be fully diesel-electric, the Northern Leader features low emissions and high fuel efficiency.

The propulsion is powered by propellers supplied by Schottel, a long-term customer of Vacon. This is the first time Z-Drives have been installed on a longliner. The two Schottel Z-Drive rudder propellers are each controlled by a 1,000 kW VACON® NXP Liquid Cooled drive, and one Schottel tunnel thruster is controlled by a 300 kW VACON® NXP Air Cooled drive. The VACON® NXP units are bidirectional (regenerative) active front-end units, which are suitable for applications where low mains harmonics are required. The diesel generating system consists of four Caterpillar C32 gensets rated at 715 kW each, one Caterpillar C18 genset rated at 425 kW, and one Caterpillar C9 genset rated at 238 kW.

Joe Martinac, President of J.M. Martinac Shipbuilding, says: "The VACON® NXP drives with active front-end (AFE) technology were chosen for their optimal performance, compact footprint and ability to minimize harmonic distortion to vessel systems. Combined with the Schottel Z-Drives for enhanced control of the ship, they give the captain virtually seamless power on tap when needed. The fluctuating power demand inherent in longlining is well suited to take advantage of the efficiencies of a diesel-electric propulsion system, since the generators can be tailored on-line to the power demand at any given time. The Automatic Power Management System supplied by Techsol, Canada, is designed to optimize efficiency under all operating conditions."

Sustainable fishing

Northern Leader has been designed to reduce waste and maximize the value of the catch through full utilization of primary and secondary, less valuable products. The vessel has the space and capacity to save components of the catch that previously would have been discarded.

> ***"The National Marine Fisheries has determined that the industry may capture up to 12 percent of the ocean's available catch,"*** *says Nick Delaney, Managing Director, Alaskan Leader Fisheries - press release published on December 6, 2012.*

"This fishing limit is one of many ways that the industry ensures sustainable fishing. Jensen has designed this new longliner to help meet this limit while maintaining a responsible, sustainable catch. The Northern Leader is not only one of the largest longliners in the world, but it's also one of the greenest ever designed."

In detail

J.M. Martinac Shipbuilding Corporation, now in its third generation of family management, specializes in the design and construction of vessels up to 250 feet (76 m) long. Over the years they have delivered more than 300 vessels, including tuna seiners, harbor tugs for commercial and military customers, oceangoing tugs, factory trawlers, ferries, yachts, U.S. Coast Guard patrol boats and a research sailing vessel.

Jensen Maritime, part of Crowley Maritime Corporation, Inc., is a full-service naval architecture firm, providing solutions from concept design all the way through vessel delivery. Jensen was very pleased to bring its more than 50 years of naval architecture and marine engineering services to the Northern Leader and the Alaskan Leader Fisheries.

Techsol Marine, part of the Imtech Marine group, is an established systems integrator of 'Whole Ship Solutions' including propulsion, automation and electrical distribution equipment for the Workboat Marine marketplace. Based in Quebec City Canada, Techsol has been an innovator in the field of energy-efficient electric propulsion technology.

Northern Leader, a state-of-the-art fishing boat, was christened in Seattle, WA, USA, on July 31, 2013. Northern Leader is 184 feet (56 m) long, 42 feet (12.8 m) wide and has a depth of 18.75 feet (5.7 m).

Northern Leader has a crew of 31 to support fishing and processing. Northern Leader has more than 38,000 cubic feet (1076 m3) of freezer hold, representing a frozen production capacity of 1,867,000 pounds (almost 847,000 kg), which is one of the largest freezer hold capacities of any longliner vessel. The maximum freezing capacity is 153,000 pounds (69,400 kg) a day.

Longline fishing is a commercial fishing technique that uses a long line, called the main line, with baited hooks attached at intervals. The Northern Leader is capable of fishing 76,800 hooks using a Mustad Auto line Super Baiter designed by Mustad Longline AS in Norway. The length of line may stretch to 45 miles (72 km)!

Photos courtesy of J.M. Martinac.

This case story was originally released before the merger of Vacon and Danfoss Power Electronics was fully completed on 15 May 2015. As a result, Vacon as a company brand no longer exists and contact persons mentioned in the story may have changed. Future case stories on VACON® products will be released on behalf of the new organization – Danfoss Drives – which is part of the Danfoss Group.

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